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THE UNITED STATES PATENT AND TRADEMARK OFFICE
BOARD OF PATENT APPEALS AND INTERFERENCES

Attorney Docket No.: 40544.00301

In re: Gilchrist, et al.

Serial No.: 09/424,811

Title: Method of Producing Water-Soluble Glass
Fibers

Filed: 30 November 1999

Art Unit: 1731

Assistant Commissioner of Patents
Washington, DC 20231

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**BOARD OF PATENT APPEALS
AND INTERFERENCES**

AMENDED APPEAL BRIEF

INTRODUCTION

The Applicants (Appellants) filed an Appeal Brief on September 9, 2002 within the time limit pursuant to 37 C.F.R. § 1.192. The Appeal Brief addressed therein the comments made by the Examiner in his Office Action dated September 13, 2001, deemed final, rejecting all of the claims pending in the application. The Appellants filed an amendment after final, dated February 13, 2002, which was not entered onto the record by the Examiner.

The Appeal Brief filed September 9, 2002, was deemed to be defective for noncompliance with 37 C.F.R. § 1.192(c), in a notification dated October 23, 2002. On November 19, 2002, Appellant's representative initiated a telephone interview to list each element of non-compliance. Examiner John Hoffman stated non-compliance was limited to his belief that Appellant had not shown support for the limitation, in (amended) claim 1, of maintaining the working temperature.

The Appellants have amended and supplemented the Argument section in this brief, pertaining to the rejection under 35 U.S.C. § 112, to further direct the Examiner to the support in the application for the limitation.

REAL PARTY IN INTEREST

The real party of interest is Giltech Ltd., (U.K.) assignee from the inventors, Thomas Gilchrist and David Michael Healy.

RELATED APPEALS AND INTERFERENCES

No other appeal or interference exists involving the application identified in the caption of this brief is known to the inventors or the assignee of the inventors which will directly affect or be directly affected or have a bearing on the Board's decision in the pending appeal.

STATUS OF THE CLAIMS

Pending claim 1 has been amended once and is rejected.

Pending claim 2 is pending as originally filed in the application and is rejected.

Pending claims 3 through 8 have been amended once and are rejected.

Claim 9 has been cancelled.

Pending claim 10 has been amended once and is rejected.

Pending claims 11-15 are pending as originally filed in the application and are rejected.

Claims 16 through 20 have been cancelled.

STATUS OF THE AMENDMENTS

The amendment filed after the final Official Action dated September 13, 2001 has not been entered.

The assignee has filed a petition to invoke the supervisory authority of the Commissioner of Patents which outlines the prosecution of the application and

summarizes the errors which were made by the Examiner in the prosecution of the application regarding; (a) the refusal of the Examiner to consider the Information Disclosure Statement dated June 23, 2000 and related documents, (b) suggesting the applicant had submitted deceptive or erroneous information to the United States Patent and Trademark Office and (c) refusing to consider the applicants' response to the final rejection. Further, the petition presents arguments which support actions requests by the applicant concerning the errors by the Examiner in the prosecution of the application.

SUMMARY OF THE INVENTION

The present invention provides a method for forming a water soluble glass fibre and/or glass wool, the method comprising producing a water soluble glass and heating said glass above its melting point to form molten glass (page 4, lines 23-27), cooling at least a portion of said molten glass to a pre-selected working temperature (page 4, lines 28-36, and page 5, line 1) and then processing said molten glass having said working temperature into fibres and/or wool (page 5, lines 14-36 and page 6, lines 1-5).

ISSUES

Whether claims 1-8 and 10-15 are unpatentable under 35 U.S.C. § 112, first paragraph as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s) at the time the application was filed, had possession of the claimed invention.

Whether claims 1-8 and 10-15 are unpatentable under 35 U.S.C. § 103 over Gilchrist (U.S. patent no. 5,470,585) in view of Lowenstein (The Manufacturing Technology of Continuous Glass Fibres).

GROUPING OF THE CLAIMS

The claims of the application do not stand or fall together.

ARGUMENT

(i) Rejections based on 35 USC 112, first paragraph

Claims 1–8 and 10–15 were rejected under 35 USC 112, first paragraph, as containing subject matter which was not described in the specification.

The subject matter defined by each of the rejected claims refers to a method for forming water-soluble ion releasing glass fibers. The Examiner has erred in rejecting the amended claim 1 (which all other rejected claims directly or indirectly depend) based on the lack of “support for the new limitation of maintaining the temperature of the portion at the working temperature”.

Support for “maintaining” a working temperature is disclosed throughout the specification and particularly on page 10, line 29 and page 11, line 14 in regard to the examples and on page 6, lines 7-30 wherein a discussion of the method in regard to the working temperature and fiber formation exists. Specifically, on page 6 lines 12-14, the working temperature is defined as “the temperature of the glass as fibre formation (i.e. pulling) takes place.” It should be appreciated from this definition that the working temperature must be maintained while fiber formation (i.e. pulling) occurs.

The “maintaining” of the working temperature during “the process of the invention” is supported in the specification on page 5, lines 21-24, wherein it is stated, “[t]he temperature of the composition during which fibre formation is possible (the working temperature) should be noted and used as a preliminary working temperature in the process of the invention.” Thus, the application gives support for maintaining a working temperature of the molten glass and maintaining the working temperature during the process “fiber formation” of the invention as recited in (amended) claim 1.

Based on the application as filed, support for the added limitation of “maintaining” the working temperature would be appreciated by one of skill in the art. Further, the Appellants respectfully submit that one of skill in the art would appreciate the necessity of maintaining the working temperature of the molten glass and the working temperature “limitation” (of being maintained) during the process of the invention, to form fibers, disclosed in the specification to make and use the invention.

Appellants respectfully submit that since a working temperature is the temperature at which a process is performed, in this case temperature which fiber formation takes place, as clearly set forth on page 6 of the Specification, lines 12 through 14, and that since “working” is well-known as defining a parameter or quality or characteristic or condition which is “adopted to permit or facilitate further work or activity”, anyone of even the most modest, even minimal skill in the art to which this invention pertains, having some familiarity with the English language, would understand that in the practice of a process the “working temperature” is the temperature at which the process is practiced and hence that “maintaining” the working temperature is implicit and inherent in the practice of the process.

In this regard, appellants respectfully note and direct the examiner’s and the Board’s attention to the definition of “working” when that word is used as an adjective appearing in Webster’s New Collegiate Dictionary on page 1351. For the convenience of the examiner and the Board, a photocopy of that page, with the relevant definition highlighted, is attached to this brief. Appellants respectfully submit that when this definition of “working” is considered, it is manifestly clear that there is more than adequate support for the concept of “maintaining” working temperature throughout the specification of Appellants’ application.

Support for the working temperature is found in the specification; the preselected working temperature of 400 to 1000°C", is referred to on page 4, lines 31 to 32. Preferable ranges for the "working temperature" are found on page 4, lines 30 to 34 to satisfy the best mode requirement.

Claim 2, which directly depends from claim 1, is separately patentable because it further defines the rate at which the molten glass recited in claim 1 is cooled.

Claim 3, which directly depends from claim 1, is separately patentable because it recites a preferred working temperature range.

Claim 4, which directly depends from claim 1, is separately patentable because it recites a working temperature based on the temperature of the glass as initially heated.

Claim 5, which directly depends from claim 1, is separately patentable because it recites the forming of glass wool.

Claim 6, which directly depends from claim 1, is separately patentable because it recites phosphorous pentoxide as a glass former.

Claim 7, which directly depends from claim 6, is separately patentable because it recites boron containing compounds are used as glass modifiers.

Claim 8, which directly depends from claim 7, is separately patentable because it recites a glass modifier at a particular molar percentage.

Claim 10, which directly depends from claim 1, is separately patentable because it recites silver orthophosphate is added during manufacture of the glass as a source of silver ions.

Claim 11, which directly depends from claim 2, is separately patentable because it recites a working temperature of the glass.

Claim 12, which directly depends from claim 2, is separately patentable because it recites a working temperature based on the temperature of the glass as initially heated.

Claim 13, which directly depends from claim 3, is separately patentable because it recites the forming of glass wool with the limitation of claim 3.

Claim 14, which directly depends from claim 5, is separately patentable because it recites phosphorous pentoxide as a glass former with the limitation of claim 5.

Claim 15, which directly depends from claim 1, is separately patentable because it recites boron containing compounds are used as glass modifiers.

(iv) Rejections based on 35 USC 103

Claims 1 to 8 and 10 to 15 were rejected under 35 U.S.C. 103(a) as being obvious over Gilchrist (US 5470585) in view of Loewenstein (The Manufacturing Technology of Continuous Glass Fibres, 1983) and Tooley (Handbook of Glass Manufacture, 1954). The Examiner considers that Gilchrist teaches that water soluble glass fibers may be formed by conventional methods.

The Examiner states that Gilchrist discloses the invention of fibers which are dissolvable and quotes Claims 1 and 3 to support his position. Whilst Gilchrist refers to a water soluble glass, and reference is made to that glass being in the form of "fibres", the Examiner has erred in not recognizing Gilchrist fails to teach how such fibers are manufactured. The use of conventional

Presumption Gilchrist is excluded
methodology was in fact successful in only providing short brittle fibers from such compositions. The difficulty in using the conventional "heat and pull" method is that a phosphorous pentoxide water soluble glass composition remains of suitable viscosity for pulling for only a very short period, typically a few minutes, before crystallization. This contrasts to silicon dioxide based glasses

? what (conventionally used for fiber formation which may remain suitable for pulling for several hours. This problem of forming fibers from phosphorous pentoxide water soluble glass compositions had not been fully understood or elucidated prior to the date of the current Application.

It should be noted that the temperatures (as recited in the independent claim) to which the water soluble glass is heated prior to pulling and also the working temperatures (as also recited in the independent claim) to which the molten glass is cooled are considerably lower than the temperatures used for non-phosphorous pentoxide based non-water soluble glass compositions as referred to in the two secondary references, Loewenstein and Tooley et al. The establishment of the correct temperature for pulling the glass fibres is not a simple "routine experimentation" suggested by the Examiner. In fact, this issue of the correct temperature goes to the very heart of this invention. The difficulty is that the phosphorous pentoxide water soluble glass compositions under consideration here commence crystallization at or around the viscosity at which pulling can occur and that such crystallization is then very rapid.

Applicant submits that the Examiner's statement that "a glass is a glass is a glass" is naive. Loewenstein, one of the references cited by the Examiner in support of the 35 USC 103 objection, states on page 33 that:

"over 99% of all continuous glass fibre produced is of "E" glass type composition".

Other types of glass compositions are then discussed. None of these

glass compositions are phosphorous pentoxide water soluble glass, but instead use silicon dioxide as the glass former. Thus, from the reference cited by the Examiner, it is clear that the persons of ordinary skill in the art had only succeeded in providing glass fibers from silicon dioxide compositions, none of which correspond to the glass composition under consideration here. Indeed, Applicant encloses an extract from Matweb.com for E-Glass fiber which indicates that the glass comprises 54.3% SiO₂ and has a melting point of 1725°C, well outside the range specified in the present invention.

As the viscosity of the molten non-water soluble glass compositions is so high, it is problematic to draw such compositions into fibers. The Examiner states that it would be obvious to one skilled in the art to cool glass that is too fluid to form into glass to have the appropriate viscosity. However, Applicants (Appellants) submit that this view is overly simplistic; the steep temperature viscosity gradient of the particular glass compositions covered here mean that the composition will quickly become too viscous to pull. Additionally, due to the particular chemical composition of phosphorous pentoxide based glasses, there is a great tendency for the compositions to crystallize at or about the temperature of fiber formation and thus prevent fiber formation. Hence, the temperature ranges specified need to be carefully observed.

Gilchrist discloses a water-soluble glass able which releases silver ions. Only conventional methods of manufacture are disclosed (column 4, lines 42 to 49 of Gilchrist '585). Conventional methods of forming water-insoluble glass fibers are not successful when used to process water-soluble glass formulations. No examples in the Gilchrist reference disclose formation of glass fibers. Hence Gilchrist does not disclose or suggest suitable methodology for the formulation of a water-soluble silver ion-releasing glass fiber.

The Examiner asserts that it would have been obvious to one skilled in the art at the time of the invention to manufacture the glass of Gilchrist using the

methods disclosed in either Tooley or Loewenstein. Applicants (Appellants) dispute this.

Tooley does not relate to manufacture of water-soluble glass fibers, but to manufacture of non-soluble, bulky, silicon dioxide-based glass objects like bottles (see page 374). As such Tooley relates to an altogether different technology-- manufacture of insoluble silicon dioxide-based glass (see Tooley's examples on pages 243, for which Tooley's results are set forth in his Figures IX-B-2 and IX-B-3)--than the invention as presently claimed. One ordinarily skilled in the art of manufacture of phosphorus pentoxide-based soluble glass would have had no motivation to find, much less combine the teachings of, a document primarily disclosing a method of manufacturing silicon dioxide-based water-insoluble glass bottles (Tooley) with the teachings of a document disclosing water-soluble glass containing and releasing silver ions (Gilchrist).

At the time of the invention it was understood that water-soluble glass fibers could not be formed by conventional glass making techniques. For instance, the fibers formed by the method of US 4,604,097 (referred to on page 3, lines 5-10 of this application) have a very low tensile strength. The ordinarily skilled worker would have been prejudiced against using a method to manufacture non water-soluble silicon dioxide-based glass bottles to manufacture water-soluble phosphorus pentoxide-based glass fibers. There is no suggestion in any of the cited prior art documents that the method of Tooley would prove to have utility in this field with these materials.

The method described in Tooley involves the steps of heating the glass forming composition above its melting point, and then cooling it to a working temperature. The working temperature is defined in terms of the viscosity of the glass.

In further response to the Examiner's comments, the present invention

clearly discloses the step of maintaining the molten glass at the working temperature. The method of Tooley involves cooling the molten glass to a working temperature where the working temperature is cool enough to allow the glass articles to be formed, presumably by glass blowing or casting. Tooley neither discloses nor suggests maintaining the glass at the working temperature before processing. Neither does Tooley disclose processing the molten glass at the working temperature into fibers.

Tooley does not relate to water soluble glass, nor does Tooley relate to silver ion-releasing glass. Tooley relates to silicon dioxide-based insoluble glass. It would not have been obvious to one ordinarily skilled in the art to combine Gilchrist with Tooley and there was no suggestion or motivation to do so. Furthermore Applicant submits that the combination of Tooley and Gilchrist would not lead one ordinarily skilled in the art to the present invention since the step of maintaining the molten glass at the working temperature and the step of processing the molten glass into fibers are not disclosed or suggested.

Loewenstein relates to glass compositions and methods of continuous glass fiber manufacture. Loewenstein discloses a method of manufacturing long lengths of water-insoluble glass fibers typically for electrical applications. As such, Loewenstein is no more relevant to the patentability of this invention than the prior art noted in applicant's specification, namely conventional pulling techniques as mentioned on page 2, line 14 of the application.

Moreover, Loewenstein, being concerned with production of long, continuous fibers for electrical and optical applications, where fiber length is paramount, is not concerned and would not be of interest to one of ordinary skill in the art to which this invention pertains--the creation of water-soluble short fibers of phosphorus pentoxide-based glass, suitable for biological, as contrasted to electrical, applications. For biological applications, unlike in electrical applications, fiber length is not a consideration. In biological applications, to

which the fibers of the invention are directed and will be used, long length is not a requirement and in many cases would do nothing but require another step in the manufacturing procedure—that being the step of cutting the fibers to a shorter length so that they could be implanted or combined with a carrier for implantation, etc. Hence, a worker in the biological field, being unconcerned with longer fibers and in fact trying to produce relatively short fibers, would shy away from even consulting a work such as Loewenstein's which is concerned with manufacture of such "continuous" fibers.

It would not have been obvious to one skilled in the art at the time of the invention to combine the teachings of Loewenstein with those of Gilchrist. As described above, at the time of the invention it was understood that water-soluble glass fibers, such as the phosphorous pentoxide-based soluble glasses of the preferred embodiment of this invention, do not lend themselves to conventional silicon dioxide-based water-insoluble glass-making methods, which have a very different chemistry. As such, the ordinarily skilled worker in the biological research field specializing in water soluble glasses would have been prejudiced against combining these two documents.

The method disclosed in Loewenstein involves the step of heating a composition suitable for producing a water-insoluble glass above its melting point. Loewenstein teaches that the temperature of the glass should stay constant or fall slightly (see page 103, lines 2 and 3). The temperature of the glass composition is reduced slightly while in the furnace to ensure that all of the glass is heated thoroughly (see Fig. IV/29). This is part of the heating stage. There is no suggestion that cooling and maintaining the molten glass at a lower temperature allows better quality glass fibers to be obtained.

Loewenstein does not disclose or suggest the step of maintaining a portion of the molten glass at the working temperature. As the Examiner indicated, this is an important step in the method of the present invention. Also,

Loewenstein makes no mention of water-soluble silver ion-releasing glass fibers.

Claim 2, which directly depends from claim 1, is separately patentable because it further defines the rate at which the molten glass recited in claim 1 is cooled. The recited references are not concerned with nor do they give any guidance regarding the working temperature or the manner in which the working temperature is reached.

Claim 3, which directly depends from claim 1, is separately patentable because it recites a preferred working temperature range. The recited references are not concerned with nor do they give any guidance regarding the working temperature or the manner in which the working temperature is reached.

Claim 4, which directly depends from claim 1, is separately patentable because it recites a working temperature based on the temperature of the glass as initially heated. Defining the working temperature in relation to the temperature of the glass as initially heated is not discussed in the recited art.

Claim 5, which directly depends from claim 1, is separately patentable because it recites the forming of glass wool. The production of glass wool fibers by the method of the present invention as recited in claim 1 is not disclosed in the recited references.

Claim 6, which directly depends from claim 1, is separately patentable because it recites phosphorous pentoxide as a glass former. Using phosphorous pentoxide as a glass former by the method of the present invention as recited in claim 1 is not disclosed in the recited references.

Claim 7, which directly depends from claim 6, is separately patentable because it recites boron containing compounds are used as glass modifiers.

Using phosphorous pentoxide as a glass former and boron containing compounds as glass modifiers by the method of the present invention as recited in claim 1 is not disclosed in the recited references.

Claim 8, which directly depends from claim 7, is separately patentable because it recites a glass modifier at a particular molar percentage. Using phosphorous pentoxide as a glass former and boron containing compounds as glass modifiers having a particular molar percentage by the method of the present invention as recited in claim 1 is not disclosed in the recited references.

Claim 10, which directly depends from claim 1, is separately patentable because it recites silver orthophosphate is added during manufacture of the glass as a source of silver ions. The production of water soluble ion releasing glass fiber using silver orthophosphate by the method of the present invention as recited in claim 1 is not disclosed in the recited references.

Claim 11, which directly depends from claim 2, is separately patentable because it recites a working temperature of the glass. The recited references are not concerned with nor do they give any guidance regarding the working temperature or the manner in which the working temperature is reached. Further, the recited references do not discuss the cooling rate of the glass to the working temperature as recited in claim 2.

Claim 12, which directly depends from claim 2, is separately patentable because it recites a working temperature based on the temperature of the glass as initially heated. Defining the working temperature in relation to the temperature of the glass as initially heated is not discussed in the recited art.

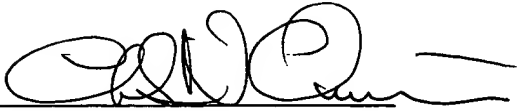
Claim 13, which directly depends from claim 3, is separately patentable because it recites the forming of glass wool. The production of glass wool fibers by the method of the present invention as recited with the limitation in claim 3 is

not disclosed in the recited references.

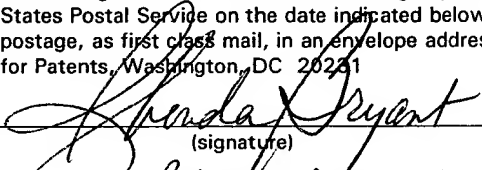
Claim 14, which directly depends from claim 5, is separately patentable because it recites phosphorous pentoxide as a glass former. The production of glass wool fibers using phosphorous pentoxide as a glass former by the method of the present invention as recited with the limitations of claim 5 is not disclosed in the recited references.

Claim 15, which directly depends from claim 1, is separately patentable because it recites boron containing compounds are used as glass modifiers. The production of glass wool fibers using phosphorous pentoxide as a glass former and boron containing compounds as glass modifiers by the method of the

present invention as recited in claim 1 is not disclosed in the recited references.

Date: 25 NOVEMBER 2002 

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 (signature)	
BY:	<u>RHONDA BRYANT</u>
DATE:	<u>25 NOVEMBER 2002</u>

APPENDIX

1. A method for forming water-soluble silver ion releasing glass fibers, the method comprising providing a composition suitable for producing a water-soluble silver ion releasing glass and heating said composition above the melting point of said glass to form a molten glass, cooling at least a portion of said molten glass to a preselected working temperature, maintaining the temperature of the portion of said molten glass at the working temperature and then processing said molten glass having said working temperature into fibers.
2. A method as claimed in Claim 1 wherein said portion of said molten glass is cooled slowly to said working temperature.
3. A method as claimed in Claim 1 wherein said working temperature is 50-300°C above the T_g of the glass.
4. A method as claimed in Claim 1 wherein said working temperature is at least 200°C below the temperature to which the glass is initially heated.
5. A method as claimed in Claim 1 wherein glass wool is formed.
6. A method as claimed in Claim 1 wherein phosphorous pentoxide is used as the glass former.
7. A method as claimed in Claim 6 wherein boron containing compounds are used as glass modifiers.

8. A method as claims in claim 7 wherein B_3O_3 is used as a glass modifier at a mole percentage of 15% or less.
9. Cancelled.
10. A method as claimed in Claim 1 wherein silver orthophosphate is added during manufacture of the glass as a source of silver ions.
11. A method as claimed in Claim 2 wherein said working temperature is 50-300°C above the T_g of the glass.
12. A method as claimed in Claim 2 wherein said working temperature is at least 200°C below the temperature to which the glass is initially heated.
13. A method as claimed in Claim 4 wherein glass wool is formed.
14. A method as claimed in Claim 5 wherein phosphorous pentoxide is used as the glass former.
15. A method as claimed in Claim 1 wherein boron containing compounds are used as glass modifiers.
16. Cancelled.
17. Cancelled.
18. Cancelled.

19. Cancelled.

20. Cancelled.

vd for me> 2: good news <what's
rd: in short — in so many words
plied that such actions were criminal
ny words> 2: in plain forthright
ls. she wasn't fit to be seen — Jean
s: not inclined to say more than is
1 of few words> of one's word
sp a promise — used only after man
ord> — upon my word: with my
ly <upon my word. I've never heard

vt: to express in words: PHRASE
1: WORDS b: VERBAGE 1 2: the
s 3: WORDING
a: test of personality and mental
it is required to respond to each of a
it evokes in his mind or with one of

VOCABULARY DICTIONARY
orm class whose members are words;

in or following the exact words

exact words: VERBATIM
-hó(ə)rd n: a supply of words

act or manner of expressing in words
not expressed in or accompanied by
ATE — word-less-ly adv — word-

iaj- n: a writer who uses words for
gard for meaning
n: the use of empty or bombastic

'mauth\ adj: orally communicated
unication
arrangement of words in a phrase.

erbal wit

which stresses are distributed on the
also word accent

r-est 1: using or containing many
of or relating to words: VERBAL —
word-iness \wɔrd-ə-nəs\ n
PROLIX, REDUNDANT shared meaning
than effective expression requires

ork, fr. OE *weorc*, akin to OHG
y in which one exerts strength or
meting: a: sustained physical or
stacles and achieve an objective or
luty that affords one his accustomed
cific task, duty, function, or assign-
phase of some larger activity 2 a
phenomena b: the result of such
~ of sea and wind> c: the
produced by the motion of the point
s measured by multiplying the force
nt of application in the line of action
rom a particular manner or method
vising <careful, police ~> <clever
at results from the use or fashioning
lain ~> 4 a: a fortified structure
, or trench> b pl: structures in
s, or embankments) or mining (as
ing or pl in constr: a place where
PLANT, FACTORY 6 pl: the working
sm <~s of a clock> 7 a: some-
ied by effort, exertion, or exercise
of many hands> b: something
itive talent or expenditure of creative
8 pl: performance of moral or
~s> 9 a: effective operation
to do its healing ~> b: manner
ECTION 10: the material or piece
pon at any stage in the process of
hing possessed, available, or belong-
tackle box, went overboard> b
nt: all possible abuse — usu. used
~ <gave him the ~>
L DRUDGERY, GRIND shared meaning
ffort or exertion ant play

working: BUSY: esp: engaged in
having effect: OPERATING, FUNC-
n process of preparation, develop-
k 1: in process of being done 2
out of work: without regular

yled for wear while working <~
<~ elephant>

wrought \rɔt\; work-ing [ME
akin to OE *weorc*] vt 1: to bring
2 a: to fashion or create by
pon: FORGE SHAPE <~ flint into
rate with needlenwork; esp: EM-
use by stirring or kneading b
by a gradual process of cutting,
or stretching <~ cold steel> 4
ation, or activity: cause to operate
and> <~ farmland> 5: to solve
ulation 6 a: to cause to toil or
f his horses nearly to death> b
to control or guide the operation

of <switches are ~ed from a central tower> 7: to carry on an
operation through or in or along <the salesman ~ed both sides of
the street> <fisherman ~ed the stream from the bridge down to the
pool> 8: to pay for with labor or service <~ed his way
through college> 9 a: to get (oneself or an object) into or out
of a condition or position by gradual stages b: CONTRIVE, AR-
RANGE <we can ~ it so that you can take your vacation> 10 a
: to practice trickery or cajolery on for some end <~ed himself
into a rage> ~ vi 1 a: to exert oneself physically or mentally esp.
in sustained effort for a purpose or under compulsion or necessity
b: to perform or carry through a task requiring sustained effort or
continuous repeated operations <~ed all day over a hot stove>
c: to perform work or fulfill duties regularly for wages or salary
2: to function or operate according to plan or design <things ~
better with oil> 3: to exert an influence or tendency 4: to
produce a desired effect or result: SUCCEED 5 a: to make way
slowly and with difficulty: move or progress laboriously <~ed his
way up to the presidency> b: to sail to windward 6: to permit
of being worked: react in a specified way to being worked <this
wood ~s easily> 7 a: to be in agitation or restless motion b
: FERMENT 1 c: to move slightly in relation to another part d
: to get into a specified condition by slow or imperceptible
movements <the knot ~ed loose> — work on 1: AFFECT
<worked on his sympathies> 2: to strive to influence or
persuade — work upon: to have effect upon: operate on
: INFLUENCE

work-able \wɔrk-ə-bəl\ adj 1: capable of being worked 2
: PRACTICABLE, FEASIBLE — work-abil-ity \wɔrk-ə-bil-ə-ti\ n —

work-able-ness \wɔrk-ə-bəl-nəs\ n
work-a-day \wɔrk-ə-dä\ adj [alter. of earlier *workyday*, fr. obs.
workyday, n. (workday)] 1: of, relating to, or suited for working
days 2: PROSAIC, ORDINARY

work-bag \wɔrk-bæg\ n: a bag for implements or materials for
work; esp: a bag for needlework

work-bas-ket \-bas-kət\ n: a basket for needlework

work-bench \-bentʃ\ n: a bench on which work esp. of
mechanics, machinists, and carpenters is performed

work-boat \-bót\ n: a boat used for work purposes (as
commercial fishing and ferrying supplies) rather than for sport or
for passenger or naval service

work-book \-búk\ n 1: a booklet outlining a course of study
2: a workman's handbook or manual 3: a record book of work
done 4: a student's individual exercise book of problems to be
solved directly on the pages

work-box \-báks\ n: a box for work instruments and materials

work camp n: a camp for workers: as a: PRISON CAMP 1 b
: a short-term group project in which individuals from one or more
religious organizations volunteer their labor

work-day \wɔrk-dä\ n 1: a day on which work is performed as
distinguished from Sunday or a holiday 2: the period of time in
a day during which work is performed — workday adj

worked \wɔrkt\ adj: that has been subjected to some process of
development, treatment, or manufacture <a newly ~ field>

worked up adj: emotionally aroused: EXCITED

work-er \wɔrk-ər\ n 1 a: one that works esp. at manual or
industrial labor or with a particular material — often used in
combination b: a member of the working class 2: one of the
sexually underdeveloped and usu. sterile members of a colony of
social ants, bees, wasps, or termites that perform most of the labor
and protective duties of the colony — see HONEYBEE illustration 3
: a usu. electrolyte plate from which printing is done

worker-priest n: a French Roman Catholic priest who for
missionary purposes spends part of each weekday as a worker in a
secular job

work farm n: a farm on which persons guilty of minor law
violations are confined

work-folk \wɔrk-fɔk\ or work-folks \-fɔks\ n pl: working
people; esp: farm workers

work force n 1: the workers engaged in a specific activity <the
factory's work force> 2: the number of workers potentially
assignable for any purpose <the nation's work force>

work-horse \wɔrk-hɔ(ə)r\ n 1: a horse used chiefly for labor
as distinguished from driving, riding, or racing 2 a: a person
who performs most of the work of a group task b: a markedly
useful or durable vehicle, craft, or machine

work-house \-háus\ n 1 Brit: POORHOUSE 2: a house of
correction for persons guilty of minor law violations

work in vt 1: to insert or cause to penetrate by repeated or
continued effort 2: to interpose or insinuate gradually or unob-
trusively <worked in a few topical jokes>

work-ing adj 1: adequate to permit work to be done <a ~
majority> 2: assumed or adopted to permit or facilitate further
work or activity <~ draft>

working n 1: an excavation or group of excavations made in
mining, quarrying, or tunneling — usu. used in pl. 2: the manner
of functioning or operating: OPERATION — usu. used in pl.

working asset n: an asset other than a capital asset

working capital n: capital actively turned over in or available for
use in the course of business activity: a: the excess of current
assets over current liabilities b: all capital of a business except
that invested in capital assets

work-ing-class adj: relating to, deriving from, or suitable to the
class of wage earners <~ virtues>

working class n: the class of people who work for wages usu. at
manual labor

working day n: WORKDAY

working dog n: a dog fitted by size, breeding, or training for
useful work (as draft or herding) esp. as distinguished for one fitted
primarily for pet, show, or sporting use

working fluid n: a fluid working substance

work-ing-man \wɔrk-ɪŋ-mən\ n: one who works for wages usu.
at manual labor

working papers n pl: official documents legalizing the employ-
ment of a minor

working substance n: a usu. fluid substance that through
changes of temperature, volume, and pressure is the means of
carrying out thermodynamic processes or cycles (as in a heat
engine)

work-less \wɔrk-ləs\ adj: being without work: UNEMPLOYED —

work-less-ness n
work load n 1: the amount of work or of working time expected
from or assigned to an employee 2: the amount of work
performed or capable of being performed (as by a mechanical
device) usu. within a specific period

work-man \wɔrk-mən\ n 1: WORKINGMAN 2: ARTISAN,
CRAFTSMAN

work-man-like \-lɪk\ adj: worthy of a good workman: SKILLFUL

work-man-ly \-lɪ\ adj: WORKMANLIKE

work-man-ship \-ʃɪp\ n 1: the art or skill of a workman
: CRAFTSMANSHIP; also: the quality imparted to a thing in the
process of making <a vase of exquisite ~> 2: something
effected, made, or produced: WORK

workmen's compensation insurance n: insurance that reim-
burses an employer for damages that he is required to pay to an
employee for injury occurring in the scope and course of his
employment

work of art 1: a product of one of the fine arts; esp: a painting
or sculpture of high artistic quality 2: something giving high
aesthetic satisfaction to the beholder or auditor <the wedding cake
was a work of art>

work off vt: to dispose of or get rid of by work or activity <worked
off his anger>

work-out \wɔrk-kaút\ n: a practice or exercise to test or improve
one's fitness esp. for athletic competition, ability, or performance

work out \wɔrk-kaút, \wɔrk-\ vt 1: to effect by labor and exertion
2 a: SOLVE b: to devise, arrange, or achieve esp. by resolving
difficulties <worked out a compromise> c: DEVELOP, ELABORATE
3: to discharge (as a debt) by labor 4: to exhaust (as a mine) by
working ~ vi 1 a: to prove effective, practicable, or suitable
<hoped his plan worked out> b: to amount to a total or
calculated figure — used with at 2: to go through a training or
practice session esp. in an athletic specialty

work over vt 1: to subject to thorough examination, study, or
treatment <shelf stock would get thoroughly worked over by
shoppers> 2: to do over: REWORK <sawed the play by working
the first act over> 3: to beat up or manhandle with thorough-
ness <the gang worked him over>

work-peo-ple \wɔrk-pé-pəl\ n pl, chiefly Brit: WORKERS, EM-
PLOYEES

work-piece \-pès\ n: a piece of work in process of manufacture

work-room \wɔrk-krúm, -krúm\ n: a room used esp. for manual
work

work-shop \wɔrk-ʃáp\ n 1: a small establishment where
manufacturing or handicrafts are carried on 2: WORKROOM 3
: a usu. brief intensive educational program for a relatively small
group of people in a given field that emphasizes participation in
problem-solving efforts

work stoppage n: concerted cessation of work by a group of
employees usu. more spontaneous and less serious than a strike

work-table \wɔrk-tá-bəl\ n: a table for holding working
materials and implements; esp: a small table with drawers and
other conveniences for needlework

work-up \wɔrk-ʌp\ n: an intensive diagnostic study <do an X
ray ~ on the chest>

work-up \wɔrk-ʌp\ n: an unintended mark on a printed sheet
caused by the rising of spacing material

work up \wɔrk-ʌp, \wɔrk-\ vt 1: to stir up: ROUSE 2: to
produce by mental or physical work <worked up a comedy act>
<worked up a sweat in the gymnasium> ~ vi: to rise gradually
in intensity or emotional tone

work-week \wɔrk-ʌwk\ n: the hours or days of work in a
calendar week <40-hour ~> <a 5-day ~>

work-wom-an \wɔrk-wʌm-ən\ n: a woman who works

world \wɔrld\ n [ME, fr. OE *world* human existence, this
world, age; akin to OHG *weralt* age, world; both fr. a prehistoric
WGmc-NGmc compound whose first constituent is represented by
OE *wer* man and whose second constituent is akin to OE *eald* old
— more at VIRILE, OLD] 1 a: the earthly state of human existence
b: life after death — used with a qualifier <the next ~> 2
: the earth with its inhabitants and all things upon it 3: in-
dividual course of life: CAREER 4: the inhabitants of the earth
: the human race 5 a: the concerns of the earth and its affairs
as distinguished from heaven and the life to come b: secular
affairs 6: the system of created things: UNIVERSE 7 a: a
division, section, or generation of the inhabitants of the earth
distinguished by living together at the same place or at the same
time <the medieval ~> b: a distinctive class of persons or their
sphere of interest <the academic ~> <the sports ~> 8: human
society <withdraw from the ~> 9: a part or section of the earth
that is a separate independent unit 10: the sphere or scene of
one's life and action 11: an indefinite multitude or a great
quantity or amount <makes a ~ of difference> 12: the whole
body of living persons: PUBLIC <announced his discovery to the
~> 13: KINGDOM 5 <the animal ~> 14 a: a celestial body
(as a planet) b: one that is inhabited *syn* see EARTH — for all
the world: in every way: EXACTLY <copies which look for all
the world like the original> — in the world: among innumerable
possibilities: EVER — used as an intensive <what in the world is

ə about ʰ kitten ər further ək back ɪ bake ɪ cot, cart
aʊ out ʧ chin ɛ less ɛ easy ɡ gift ɪ trip ɪ life
j joke ŋ sing ɔ flow ɔ flaw ɔi coin θ thin θ this
ʊ loot ʌ foot y yet yʊ few yʊ furious zʰ vision